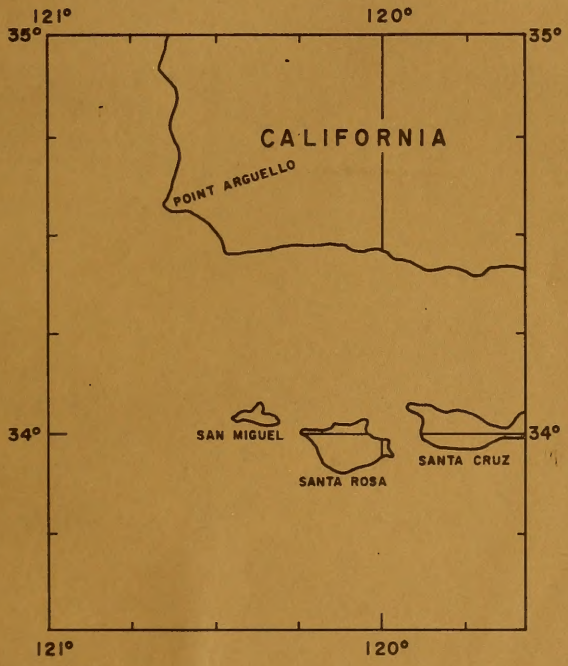
TR 201

TECHNICAL REPORT

OCEANOGRAPHIC SURVEY RESULTS OFF POINT ARGUELLO, CALIFORNIA JANUARY AND NOVEMBER-DECEMBER 1964



FEBRUARY 1968

NAVAL OCEANOGRAPHIC OFFICE
WASHINGTON, D.C. 20390

ABSTRACT

NAVOCEANO conducted two oceanographic surveys in the ocean area off Point Arguello, California, one in January and one in November-December 1964. The primary purpose of the surveys was to investigate the currents of the area; however, standard Nansen casts were taken, and bottom sediment and plankton samples were obtained.

Parachute current drogues were principally used to describe current movement off Point Arguello. A strong westerly flow along the northern portion of Santa Barbara Channel was noted in the surface layers. A corresponding easterly flowing current also was noted in the southern portion of the channel.

The major features of the surface flow appeared to be a counterclockwise rotating eddy just off Point Arguello and a deflection of the California Current due to the influence of Rodriquez Dome.

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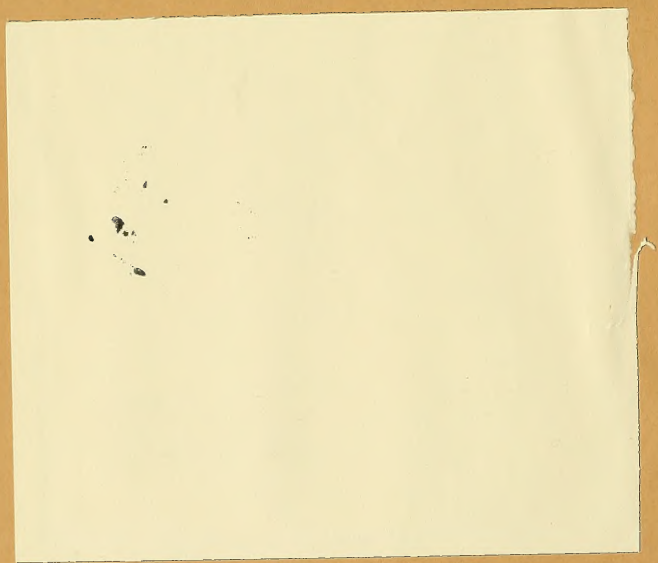

FOREWORD

The ocean area off Point Arguello, California, offers an interesting environment for oceanographic study. The area is a region of interacting current regimes and water masses. NAVOCEANO conducted two environmental surveys off Point Arguello for the Pacific Missile Range in January and November-December 1964. The primary purpose of the surveys was to investigate the currents. This report presents some analyses of the data collected with most emphasis on the currents in the area.

L. E. DeCAMP
Captain, U.S. Navy
Commander

CONTENTS

FIGURES

TABLES

APPENDIX

I. INTRODUCTION

The Naval Oceanographic Office (NAVOCEANO), conducted two environmental surveys aboard USS REHOBOTH (AGS 50) in the ocean area off Point Arguello, California, in January and November-December 1964. Both surveys were undertaken to provide oceanographic information to the Pacific Missile Range, Point Mugu, California. The primary purpose of the surveys was to investigate the currents of the area; however, standard Nansen casts were taken, and bottom sediment and plankton samples were obtained. Figure 1 shows the physiographic features of the Point Arguello area.

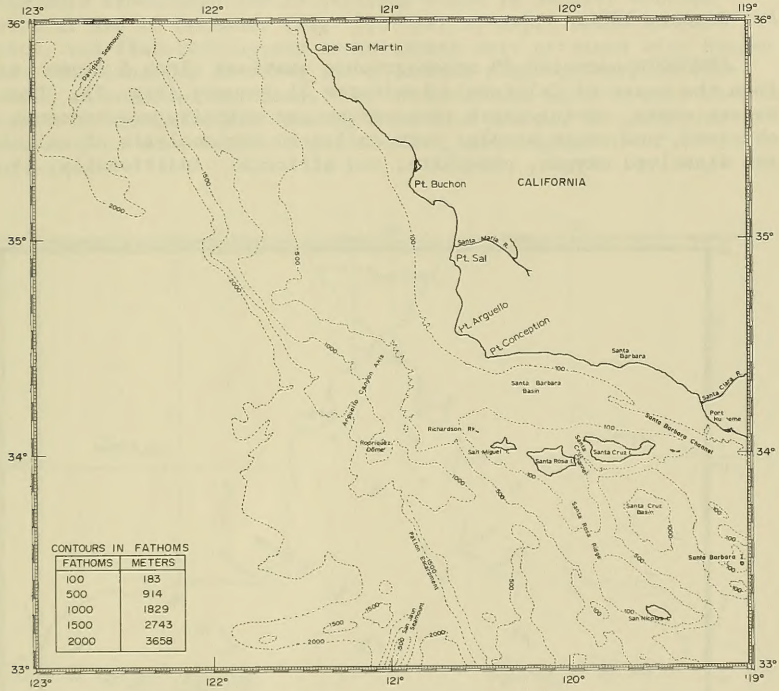

FIGURE I. PHYSIOGRAPHIC FEATURES OF POINT ARGUELLO AREA

The ocean area off Point Arguello is quite complex as several North Pacific current regimes interact. It is a profound oceanographic and faunistic boundary between true Subarctic and Equatorial Waters. The area of the surveys is located inshore of the California Current system. This current system transports water southeastward from the West Wind Drift (off Alaska) to the North Equatorial Current (off Mexico). A subsurface countercurrent below 200 meters (660 feet) is present close to the coast throughout the year. As upwelling ceases in the winter and the character of the prevailing winds changes,

a surface countercurrent, the Davidson Current, develops. This Davidson Current flows northwestward along the coast within about 80 miles of the California coast.

Surveys of the California Current system, carried out under the California Co-operative Oceanic Fisheries Investigation (CCOFI) Program (Scripps, 1949-64), repeatedly touched the area covered by the 1964 surveys, but the sampling grids employed by CCOFI surveys were too coarse to delineate small scale features.

II. NARRATIVE OF OPERATIONS

A. January 1964.

REHOBOTH occupied 19 oceanographic stations along 5 lines radiating from the coast of California beginning 21 January (Fig. 2). From Nansen casts, serial-depth temperature and salinity measurements were obtained, and water samples were collected for analysis of salinity and dissolved oxygen, phosphate, and silicate. Additionally, 16 cores,

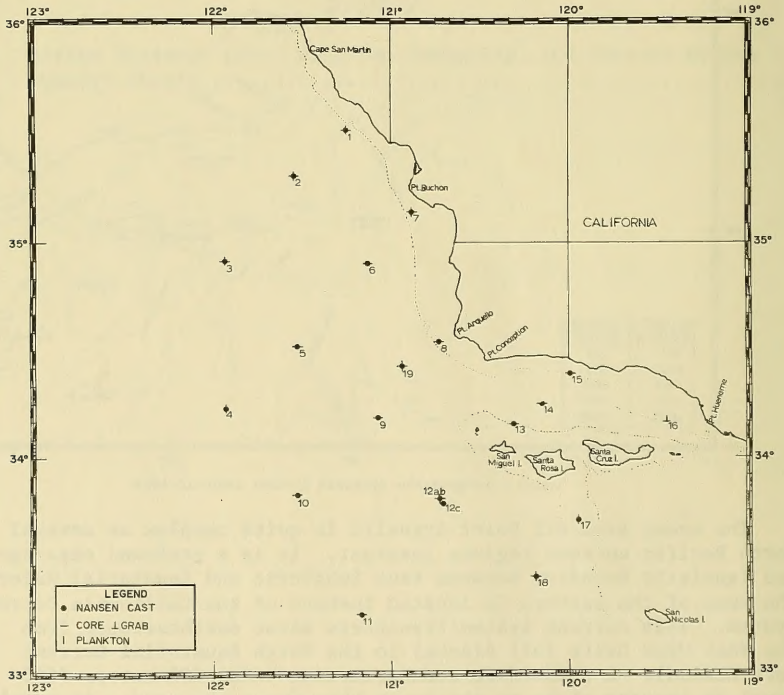

FIGURE 2. OCEANOGRAPHIC STATION LOCATIONS, JANUARY

2 parts of cores, 1 bottom grab sample, 27 bathythermograms (BT's), and 9 surface and 2 vertical plankton samples were collected on selected stations. A total of 274 drift cards was released. The observations made at each station are tabulated in Table I.

From 25 to 28 January, 19 parachute current drogues were launched and tracked.

B. November-December 1964.

REHOBOTH reoccupied the 19 stations taken in January between 25 November and 10 December (Fig. 3). Serial-depth temperature, salinity, and dissolved oxygen measurements were obtained with Nansen casts. Additionally, 10 cores and 4 surface plankton samples were collected at selected stations. The observations made at each station are tabulated in Table II. During this same period, 28 parachute current drogues were launched and tracked, and a total of 22 BT's was obtained.

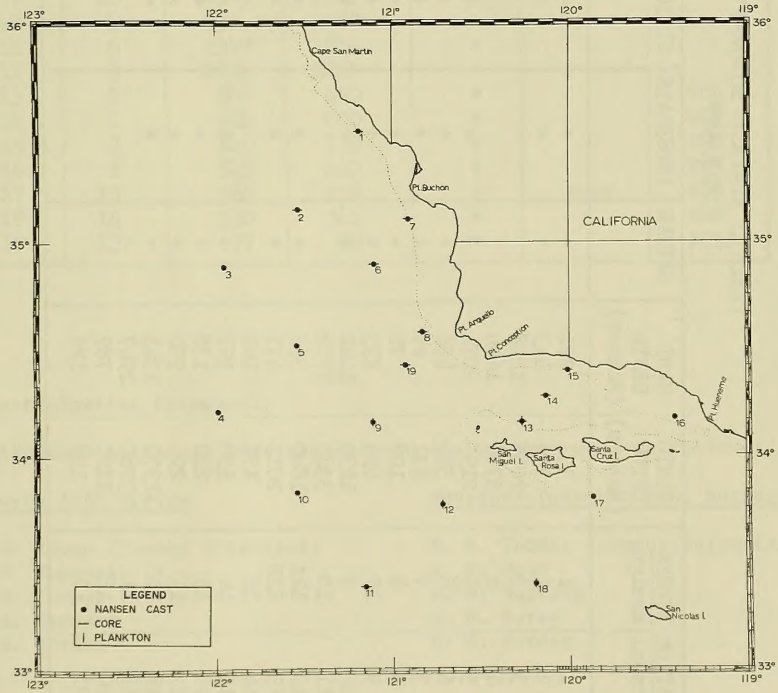

FIGURE 3. OCEANOGRAPHIC STATION LOCATIONS, NOVEMBER-DECEMBER

TABLE I. STATION SUMMARY
JANUARY

STATION NUMBER consec.	STATION NUMBER assign.	SONIC DEPTH (Meters)	CAST DEPTH (Meters)	OXYGEN	PHOSPHATE	SILICATE	PLANKTON	BOTTOM SEDIMENT	DRIFT CARDS	BT'S
1	1	333	291	+	+	+	Horz/Vert	KC1		2
2	2	796	443	+	+	+	Horz/Vert	KC2	10	
3	3	2085	1308				Horz	KC16	10	1
4	4	3737	1604				Horz		26	3
5	5	2195	2071	+	+	+		KC3	10	2
6	6	550	486	+	+	+		KC4	10	2
7	7	132	99	+	+	+	Horz	KC5		2
8	8	102	70	+	+	+		KC6	12	2
9	19	896	733	+	+	+	Horz	KC7		2
10	9	1930	1442	+	+	+		KC8	18	3
11	10	3365	2702					KC9	10	2
12	12A	1840	392	+	+	+	Horz	KC10	10	
13	12B	2015	477	+	+	+		BS1	24	
14	16	175	100					BS2	10	
15	14	530	357	+	+	+		KC11	14	
16	13	210	170	+	+	+		KC12	20	
17	15	293	250	+	+	+		KC13	10	
18	12C	1970	1343	+	+	+				2
19	11	3280	2947	+				KC14	41	1
20	18	1120	782				Horz	KC15	19	3
21	17	137	125				Horz	BS3	20	

TABLE II. STATION SUMMARY
NOVEMBER-DECEMBER

STATION NUMBER consec.	assign.	SONIC DEPTH (Meters)	CAST DEPTH (Meters)	OXYGEN	PLANKTON	BOTTOM SEDIMENT
1	16	70	60	+		
2	17	183	162	+		
3	18	1180	686	+	Horz	
4	12	1940	918	+	Horz	
5	11	3510	473	+		KC1
6	8	110	105	+		KC2
7	19	885	656	+		KC3
8	9	2000	1693	+	Horz	
9	10	3380	2941	+		
10	4	3594	3227	+		
11	5	2377	1816	+		
12	3	2290	1862	+		
13	2	568	490	+		KC4
14	1	254	200	+		KC5
15	7	146	139	+		KC6
16	6	545	489	+		KC7
17	13	366	238	+	Horz	KC8
18	14	530	341	+		KC9
19	15	77	60	+		KC10

C. Participating Personnel.

NAVOCEANO personnel participating in the surveys were as follows:

January 1964 Survey

G. H. Knoop (Senior Scientist)
R. P. Kopenski
R. W. Thomas
R. A. Stewart
L. S. Jordan

November-December 1964 Survey

R. W. Thomas (Senior Scientist)
R. K. Oser
R. M. Heavers
S. W. Dorey
L. S. Jordan

III. METHODS AND PROCEDURES

A. Instrumentation and Data Collection.

Serial-depth temperature, salinity, and dissolved oxygen data were obtained by standard Nansen cast techniques. Paired protected and unprotected deep sea reversing thermometers were placed on the Nansen bottles for *in situ* temperatures. Water samples were drawn from the Nansen bottles for chemical analyses.

On the January survey, water samples for dissolved oxygen, phosphate, and silicate analyses were drawn at the stations located within a 50-mile radius of Point Arguello. The phosphate and silicate samples were frozen for later analysis at NAVOCEANO.

On both surveys, temperature measurements were made periodically with mechanical BT's. BT data were forwarded to the National Oceanographic Data Center (NODC) for processing.

The bottom sediment samples were obtained by means of a Kullenberg corer and an orange peel sampler at the stations shown in Figures 2 and 3. The cores were protected against desiccation by coating the core liners in a specially constructed wax bath.

Surface plankton hauls (Figs. 2 and 3) were obtained with a half-meter net, mesh size #0, as the ship drifted on station. For vertical hauls, the same net was lowered to 200 meters and retrieved. The samples were preserved and shipped to the NAVOCEANO biological laboratory for analysis.

Parachute current drogues, with the parachute at either 50, 300, 500, or 1,000 feet (15, 90, 150, or 305 meters), were released and tracked. Positioning of the drogues on the January survey was by radar range and bearing. Because of new requirements on the ship's time, drogue observations were abridged. Drogue positions were determined chiefly by Lorac on the November-December survey, but, since Lorac coverage did not extend north of Point Arguello, radar was used for some positions.

B. Methods of Analyses and Disposition of Data.

Reversing thermometer temperatures were read to ± 0.01°C and corrected by standard methods.

Salinities were analyzed aboard ship with a conductive salinity bridge during the January survey and an inductive salinometer during the November-December survey.

Dissolved oxygen concentrations were determined aboard ship using a modified Winkler titration method.

The phosphate and silicate samples were analyzed by spectrophotometric methods at the NAVOCEANO chemical laboratory. Unfortunately, the values obtained are questionable since the samples partially thawed during shipment. There is no discussion of these data in this report.

The physical and chemical oceanographic data were coded and forwarded to NODC for processing by electronic computer. Machine computations provided temperature, salinity, and dissolved oxygen interpolations at standard depths, in addition to density (sigma-t), specific volume and dynamic depth anomalies, and sound velocity calculations. The phosphate and silicate concentrations at observed depths were added to the computation listings. Listings of these data are on file at NODC under cruise reference numbers 31268 for January and 31216 for November-December.

At the conclusion of both surveys the bottom sediment samples were shipped to the Bureau of Mines facility at Tiburon, California, where NAVOCEANO personnel analyzed them for engineering properties. Sub-samples were forwarded to the NAVOCEANO geological laboratory for sediment size and composition determination. Core analysis summary sheets of engineering properties and sediment size and composition are on file at NAVOCEANO under Laboratory Item 227 for January and Item 242 for November-December. The grab sample and the two parts of cores from the January survey were not analyzed. Log sheets of the bottom sediment data from both surveys are presented in the appendix. Since bottom sediment distribution has been amply covered by other works (e.g., Emery, 1960). The sediment data are not discussed in this report.

The BT data are on file at NODC under reference number 08382 for January and 08383 for November-December.

Results from the drift card releases have not been obtained.

At NAVOCEANO, the plankton samples were filtered through cotton cloth. The volume of each wet sample was read in a graduated cylinder and water added to the 100cc level. Aliquots of 2cc were drawn while stirring the sample. A sufficient number of aliquots were removed to include 4 to 20 percent of the sample, depending on the total volume of plankters involved. The type and number of plankters from the January and November-December surveys are tabulated in the appendix.

Parachute current drogue tracks were plotted and are included in this report. Average velocities were computed to the nearest tenth of a knot for each observation interval. Current drogue summary sheets are presented in the appendix.

IV. ANALYSIS AND RESULTS

A. Temperature.

During the January survey, surface temperatures were cooler offshore with the isotherms oriented almost north-south (Fig. 4). At depths below 100 meters (330 feet), temperatures decreased seaward with the isotherms paralleling the bottom topography. Figure 5 shows horizontal temperature distribution at 200 meters (660 feet).

A more complex, and essentially opposite, distribution of temperature developed during the November-December survey. Surface temperatures increased seaward with a lobe of cooler water extending south from Point Arguello (Fig. 6). Warmer water occurred along the northern side of Santa Barbara Channel. A similar pattern existed at 200 meters (Fig. 7). Station 9 exhibited anomalously low temperatures at all depths below 100 meters.

B. Salinity.

Surface salinities in January were higher nearshore with an ill-defined lobe of more saline water extending south and west from Point Arguello (Fig. 8). A small salinity range of about .02‰ existed below 100 meters, but generally, the lower values were to the south and east.

Surface salinities during the November-December survey decreased seaward (Fig. 9). The range of salinity values was again small below 100 meters, but higher values occurred in the Santa Barbara Basin and at the outer stations southwest of Point Arguello.

C. Dissolved Oxygen.

In January, dissolved oxygen distribution below 100 meters indicated a wedge of relatively low oxygen content water extending toward Point Arguello from the southwest. During the November-December survey, this same low oxygen wedge existed, although displaced slightly to the north. In the Santa Barbara Basin, low dissolved oxygen content values existed below sill depth during both surveys.

D. Currents.

1. Tides. A mixed tide with a mean range of 3.7 feet characterizes the Point Arguello area. The diurnal range is less than 5.4 feet, and the extreme range, attained during the spring tides of the solstices, is 8.8 feet (USC&GS, 1964).

The tide wave moves from southeast to northwest at such a rate that high tide reaches Point Buchon about 30 minutes after passing Port Hueneme. The associated currents theoretically reach their

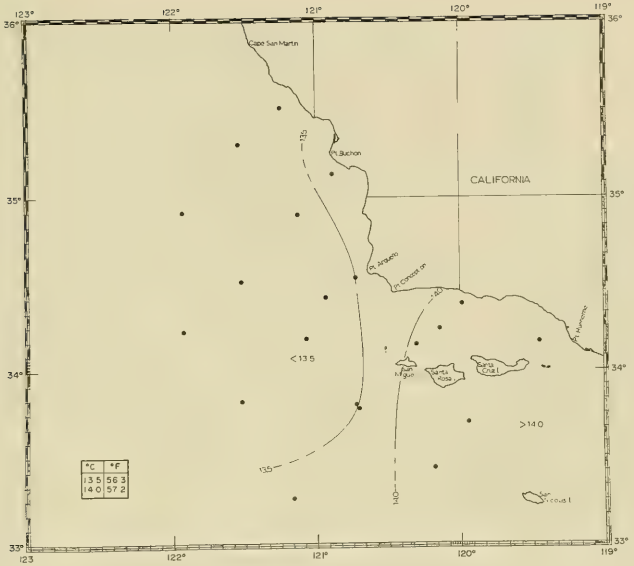

FIGURE 4 SURFACE TEMPERATURE DISTRIBUTION (°C), JANUARY

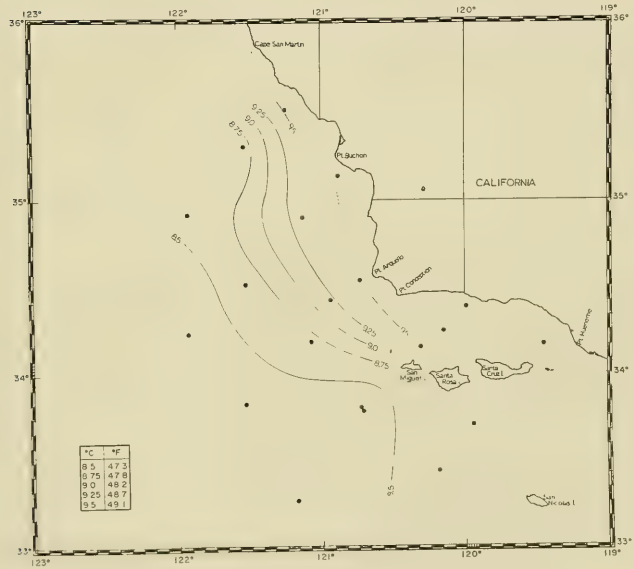

FIGURE 5. TEMPERATURE DISTRIBUTION (°C) AT 200 METERS, JANUARY

FIGURE 6. SURFACE TEMPERATURE DISTRIBUTION (°C), NOVEMBER-DECEMBER

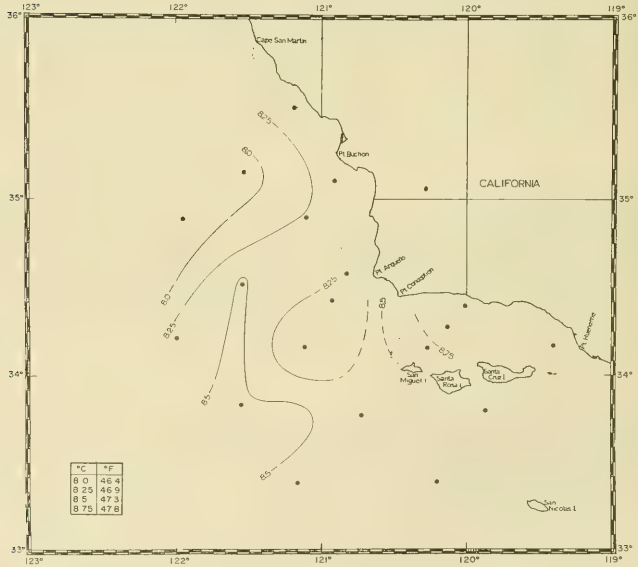

FIGURE 7. TEMPERATURE DISTRIBUTION (°C) AT 200 METERS, NOVEMBER-DECEMBER

FIGURE 8. SURFACE SALINITY DISTRIBUTION (‰), JANUARY

FIGURE 9 SURFACE SALINITY DISTRIBUTION (‰), NOVEMBER–DECEMBER

maximum velocities between high and low tide and rarely exceed 0.5 knot. On the open shelf, tidal currents are rotary in a clockwise manner and make a complete cycle in about 12.4 hours. Boundary conditions near the shore and at the bottom, however, confine the tidal current largely to directions parallel to shore or bottom contours.

2. Parachute Current Drogues. The tracks of the parachute current drogues released in January are shown in Figure 10. Twelve of the drogues had the parachute at 50 feet, four at 300 feet, and three at 1,000 feet.

FIGURE 10. PARACHUTE CURRENT DROGUE MOVEMENT, JANUARY

The 50-foot drogues released in a line radiating southwest from Point Arguello indicated southwestward flow nearshore and a northerly flow near 121°W longitude. The 300-foot drogues followed a similar, but less pronounced, movement. The 1,000-foot drogue apparently lost its parachute and became influenced by prevailing winds.

The drogues along the northern entrance to Santa Barbara Channel revealed mixed flow directions. Those near the coast moved generally eastward, but they exhibited a period of westward flow, probably the

result of tidal currents. The drogues in the center of the channel entrance showed a westward outflow from the channel. The most southern drogue suggested a weak eastward flow.

In Santa Barbara Channel, north of Santa Cruz Island, the drogues revealed a counterclockwise, eddy-type flow. The drogue released near the entrance to Santa Cruz Channel showed a counterclockwise flow that was displaced into the channel.

The tracks of the drogues released during the November-December survey are shown in Figure 11. Twenty-two of the drogues had parachutes at 50 feet, one at 300 feet, and five at 500 feet.

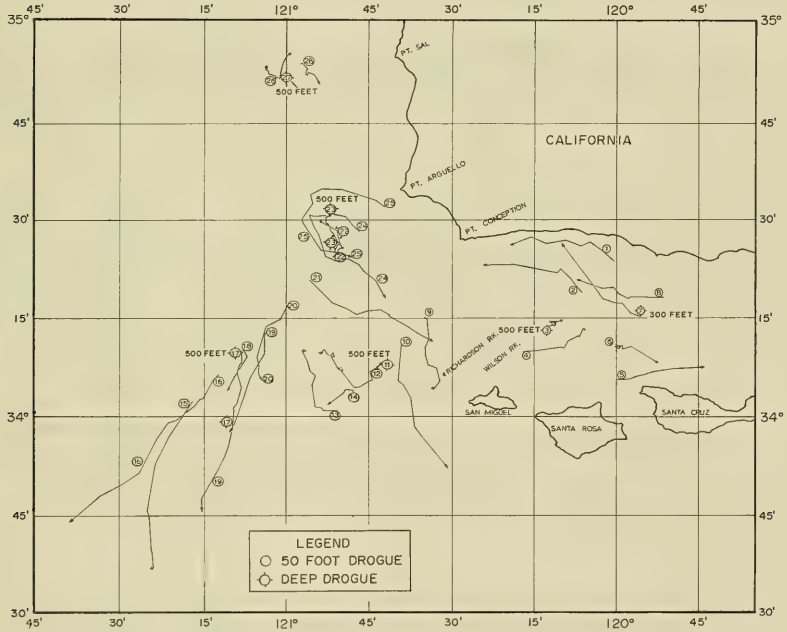

FIGURE 11. PARACHUTE CURRENT DROGUE MOVEMENT, NOVEMBER-DECEMBER

On this survey, three drogues were launched north of Point Arguello, off Point Sal. The two drogues at 50 feet moved in opposite directions. The 500-foot drogue, launched between the 50-foot drogues, moved northward, turning northeastward.

Southwest of Point Arguello, drogue patterns indicated a counterclockwise rotating eddy that was centered about 15 miles from shore. Flow from the southern edge of this eddy appeared to be eastward. As the drogues moved to the east, a southern component became apparent, similar to the pattern displayed by drogues released near the entrance to Santa Barbara Channel.

Farther south, along the line extending southwest from Point Arguello, the drogues showed a definite southwest flow pattern. Between this southwest flow and the southward flow near the entrance to Santa Barbara Channel, drogues displayed a northwestward component, indicating a probable eddy.

The drogues in Santa Barbara Channel described a mixed flow. The drogues along the north side of the channel indicated a strong westward current, whereas the drogues along the south side indicated an equally strong eastward current.

The effect of tidal currents on drogues is difficult to ascertain on both the January and November-December surveys because of the large time lapses between navigational fixes. Also, other factors, such as drag, prevailing winds, and localized eddies will influence drogue movement.

3. Geostrophic Currents. Surface dynamic topographies were contoured relative to the 200-meter (660 feet) and 500-meter (1640 feet) reference levels, and the topography at 200 meters was contoured relative to the 500-meter level. The 200-meter reference level was selected because it utilized a maximum amount of the data, and the 500-meter level was selected because it facilitated a comparison to the literature. In computing and analyzing the dynamic data, the major assumptions were that the reference level had no net motion, the flow was in a steady state, and the data were synoptic.

For the January survey, surface dynamic topographies indicate a counterclockwise rotating system southwest of Point Arguello (Fig. 12). North of this system, topographies show a northward movement, and to the south, a southeastward movement. The topography at 200 meters indicates flow to the north with the isobars paralleling the bottom contours (Fig. 13).

For the November-December survey, surface dynamic topographies indicate a southerly flow along the coast, turning eastward off Point Arguello (Fig. 14). The topography at 200 meters is poorly defined, but a northward flow, north of Point Arguello, and a southeasterly flow, south of the islands, are indicated (Fig. 15).

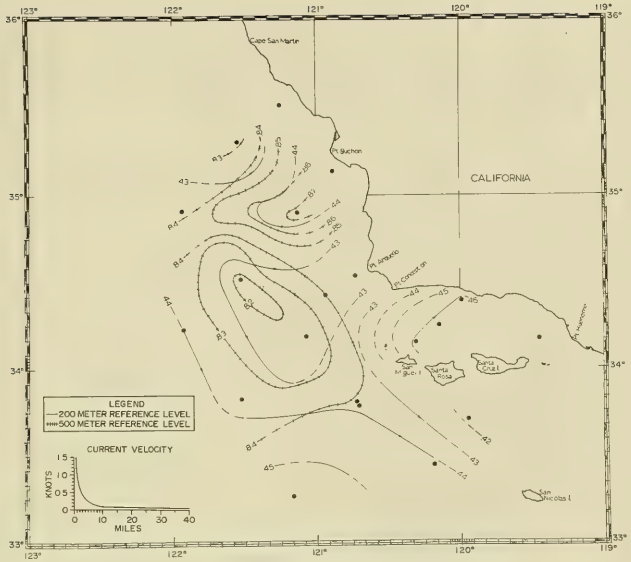

FIGURE 12 DYNAMIC TOPOGRAPHIES (0-DECIBAR SURFACE), JANUARY

FIGURE 13 DYNAMIC TOPOGRAPHIES (200-DECIBAR SURFACE), JANUARY

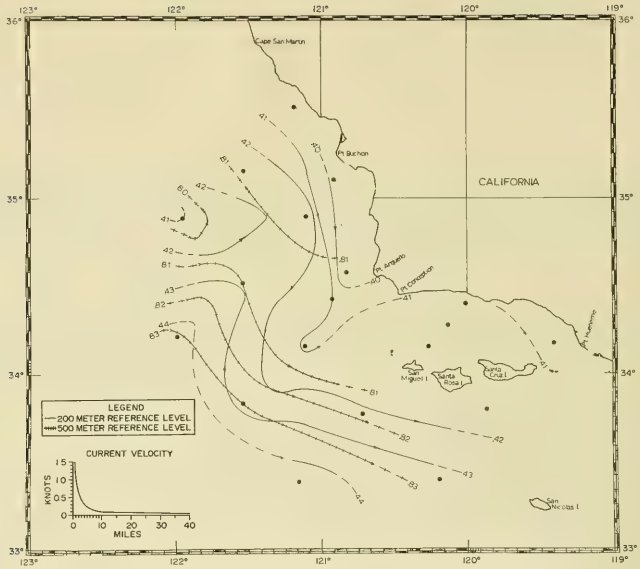

FIGURE 14. DYNAMIC TOPOGRAPHIES (0- DECIBAR SURFACE), NOVEMBER-DECEMBER

FIGURE 15. DYNAMIC TOPOGRAPHIES (200-DECIBAR SURFACE), NOVEMBER-DECEMBER

V. SUMMARY AND CONCLUSIONS

From analysis of these and other data, the flow pattern indicated in Figure 16 is believed to exist in early winter in the Point Arguello region.

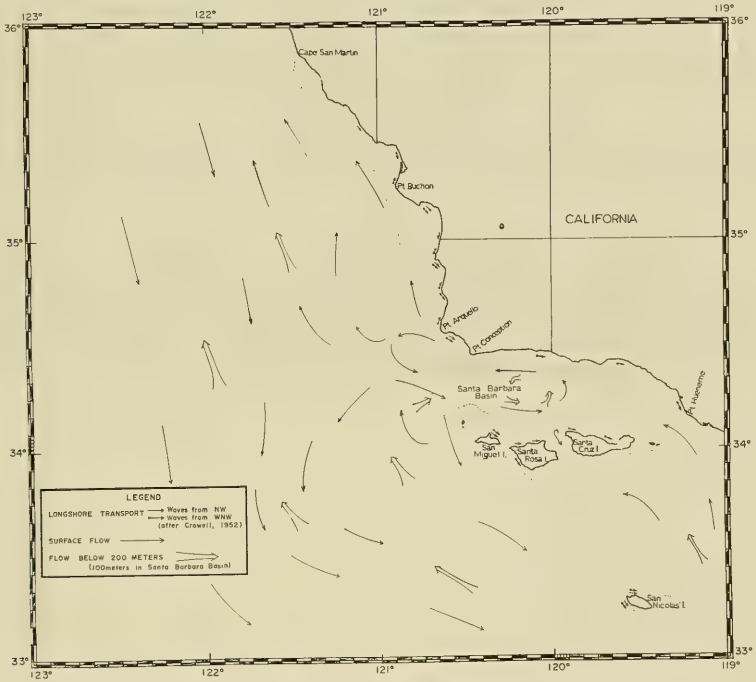

FIGURE 16. WINTER CIRCULATION

A strong westerly flow along the northern portion of Santa Barbara Channel exists in the surface layers. A corresponding easterly flowing current is developed in the southern portion of the channel. Although some water is discharged southward through Santa Cruz Channel, a larger inflow of surface waters enters between Port Hueneme and Santa Cruz Island.

North of Point Arguello, the northward flowing Davidson Current forms during November and December, and by January it is well developed. West of the Davidson Current, the California Current flows southward.

Southwest of Point Arguello, a complex series of eddys and meanders characterizes the surface flow. The major features of the area appear to be a counterclockwise rotating eddy just off Point Arguello and a seaward deflection of the California Current due to the influence of Rodriquez Dome.

The flow is northerly below 200 meters. A sluggish inflow into Santa Barbara Basin is indicated. Within the basin, flow is slow and erratic, apparently strongly influenced both by tidal and by seiche effects, but a general counterclockwise rotation is indicated.

Longshore currents transport sediments south and east along the coast (Crowell, 1952). Some sediment is discharged eastward down Arguello Canyon and its tributaries.

VI. ADDITIONAL WORK NEEDED IN THE AREA

Since the ocean area off Point Arguello offers a complex and changing environment, additional seasonal surveys, with close sampling grids, are needed for a thorough investigation of the currents. Time-series data to show tidal effects on water movement would provide corrections on parachute current drogues.

VII. REFERENCES

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APPENDIX

2 Bottom Sediment Logs
2 Plankton Summary Sheets
47 Current Drogue Summary Sheets

BOTTOM SEDIMENT LOG (JANUARY)

VESSEL: USS REHOBOTH (AGS 50) | CRUISE: 31268 | CHECKED BY: | DATE CHECKED:

BOTTOM SEDIMENT NO. (BS—)	DATE (1964)	SAMPLE POSITION LATITUDE	SAMPLE POSITION LONGITUDE	DEPTH (Fathoms)	GEOMORPHOLOGY OF IMMEDIATE AREA	TYPE OF SAMPLER	WEIGHT OF SAMPLER	APPROX. PENETRATION	LENGTH OF CORE	ROCK COLOR CHART CORE NUMBERS: CORE TOP	CORE BOTTOM	FIELD DESCRIPTION OF CORE AND REMARKS	OBS INIT
1	1/21	35°31'	121°15'	182	Shelf off Point Arguello	K'berg w/o trip arm	250 lbs	4'	42"		5gy4/1	sand-silt	Assigned station #1	
2	1/21	35°18'	121°33'	435	Shelf off Point Arguello	"	"	4'	40"		5gy5/2	sandy silt with black nodules	Assigned station #2	
3	1/22	34°31'	121°32'	1200	Slope off Point Arguello	"	"	3'	31"	5y5/2	10y6/2	sand-silt w/green & black minerals throughout	Assigned station #5	
4	1/22	34°54'	121°08'	300	Shelf off Point Arguello	"	"	4'	-				Assigned station #6	
5	1/23	35°08'	120°42'	73	Shelf off Point Arguello	"	"	3'	3'	5gy4/1	5gy4/1	sand-silt	Assigned station #7	
6	1/23	34°32'	120°43'	56	Shelf off Point Arguello	"	"	4½'	35"	10y6/2	10y4/2	sand-silt	Assigned station #8	
7	1/23	34°25'	120°56'	490	Shelf off Point Arguello	"	"	4'	38"	5y5/2	10y4/2	sand-silt	Assigned station #19	
8	1/23	34°11'	121°05'	1060	Slope off Point Arguello	"	"	4'	46"	10y6/2	10y4/2	sand-silt	Assigned station #9	
9	1/23	33°49'	121°32'	1840	Slope off Point Arguello	"	"	6'	48¾"	10y4/2	10y4/2	silt-sand	Assigned station #10	
10	1/24	33°48'	120°53'	1000	Slope off Point Arguello	"	"	3'	12"	5y5/2	-	sand, gravel w/black & green nodules	Assigned station #12A	
11	1/25	34°15'	120°09'	290	Santa Barbara Channel	"	"	-	25"	10y4/2	10y4/2	silt-sand	Assigned station #14	
12	1/26	34°09'	120°18'	200	Santa Barbara Channel	"	"	-	11"	10y4/2	10y4/2	silt-sand	Assigned station #13	
13	1/26	34°25'	119°59'	200	Santa Barbara Channel	"	"	4'	32"	5y5/2	10y6/2	silt-sand	Assigned station #15	
14	1/27	33°16'	121°10'	1790	Slope off Point Arguello	K'berg w/trip arm	"	5'	60½"	10y6/2	5gy3/2	green clay	Assigned station #11	
15	1/28	33°26'	120°11'	620	Slope off Point Arguello	"	"	6'	36"	5y5/2	5y5/2	sandy silt	Assigned station #18	
16	1/29	34°55'	121°51'	1600	Slope off Point Arguello	K'berg w/o trip arm	"	6'	57"	5y5/2	5gy4/1	silty clay	Assigned station #3	
						GRABS								
1	1/25	34°10'	119°27'									orange peel sampler	Assigned station #16	
						OTHER								
1	1/24	33°48'	120°43'									K'berg attempted but sample only in core catcher	Assigned station #12B	
2	1/28	33°42'	119°56'									K'berg attempted but sample only in core catcher	Assigned station #17	

BOTTOM SEDIMENT LOG (NOVEMBER-DECEMBER)

VESSEL: USS REHOBOTH (AGS 50) | CRUISE: 31216 | CHECKED BY: | DATE CHECKED:

BOTTOM SEDIMENT LOG NO (19[illegible]-[illegible])	DATE (1964)	SAMPLE POSITION LATITUDE (N)	SAMPLE POSITION LONGITUDE (W)	DEPTH (Fathoms)	GEOMORPHOLOGY OF IMMEDIATE AREA	TYPE OF SAMPLER	WEIGHT OF SAMPLER	APPROX PENETRATION	LENGTH OF CORE	ROCK COLOR CHART CORE NUMBERS: CORE TOP	CORE BOTTOM	FIELD DESCRIPTION OF CORE AND REMARKS	OBS INIT
1	11/26	33°22'	121°08'	1920	San Miguel Basin	K'berg w/trip arm	250 lbs	6'	3 1/2"			gray-green silt Assigned station #11	
2	11/27	34°33'	120°48'	60	San Miguel Basin	"	"	2'	15"			gray-green silt 200lbs pullout Assigned station #8	
3	11/27	34°23'	120°55'	484	San Miguel Basin	"	"	--	3'			500 lbs pullout Assigned station #19	
4	11/28	35°08'	121°30'	310	NW of Point Arguello	"	"	1'	1'			coarse black sand Assigned station #2	
5	11/28	35°31'	121°31'	139	Off Point Arguello	K'berg w/o trip arm	"	5'	24"			900 lbs pullout Assigned station coarse sand grading to green rnd #1	
6	11/28	35°06'	120°53'	80	San Luis Obispo Bay	K'berg w/trip arm	300 lbs	6'	35"			gray-olive silt Assigned station #7	
7	11/28	34°53'	121°06'	298	San Luis Obispo Bay	"	250 lbs	6'	33"			olive silt 900 lbs pullout Assigned station #6	
8	11/29	34°08'	120°15'	202	Off Point Arguello	"	"	6"	6"			olive sandy gravel Assigned station #13	
9	11/29	34°16'	120°07'	290	Santa Barbara Channel	"	"	4'	34'			sandy silt-olive Assigned station #14	
10	11/29	34°23'	120°00'	42	Santa Barbara Channel	"	"	6"	3"			sandy silt-olive Assigned station #15	

PLANKTON SUMMARY (JANUARY)

Sample Number	1	2	3	4	5	6	7	8	9	10	11
Date	1/21	1/21	1/21	1/21	1/21	1/22	1/23	1/23	1/24	1/28	1/28
Time (GMT)	2030	1930	2255	0001	0400	0945	0300	1400	0500	0430	0800
Duration of tow	10 min.	1 hr.	1 hr.	½ hr.	1 hr.	1 hr.	½ hr.	1 hr.	1½ hr.	1 hr.	½ hr.
Type of tow	Vert.	Horz.	Horz.	Vert.	Horz.	Horz.	Horz.	Horz.	Horz.	Horz.	Horz.
Depth of tow	200M.	Surf.	Surf.	200M.	Surf.	Surf.	Surf.	Surf.	Surf.	Surf.	Surf.
Ocean Station Number	#1	#1	#2	#2	#3	#4	#7	#19	#12	#18	#17
Wet Volume (< less than)	1.0 cc	6.0 cc	1.0cc	3.4cc	6.0cc	0.6cc	1.0cc	0.1cc	10cc	0.2cc	0.1cc
CHRYSOPHYTA											
Diatom											
Coscinodiscus sp.					10						
PROTOZOA											
Sarcodina											
Radiolaria		1		20	20	3	4			13	
Mastigophora											
Dinoflagellata:											
Ceratium sp.						1	4			3	6
COELENTERATA											
Scyphozoa			2	15	190	43	2	5		10	1
Hydrozoa											
Siphonophora	15	12		45	50	8	3			4	
Solmundella sp.					20	1					
Physonectid					130						
CTENOPHORA (unidentified)					20	2			1		
BRYOZOA											
(Cyphonautes)						1	1	1			
ANNELIDA											
Polychaeta (larvae)						1	2				1
ARTHROPODA											
Crustacea											
Copepoda:											
Calanus sp.	175	30	8	715	410	48	60	1	15	35	5
Rhincalanus nasutus	5				120	1	2	1	2	35	5
Rhincalanus cornutus	125	2		210	60	10	7		2	30	1
Corycaeus sp.	5			10		1	5	1			
Pleuromamma sp.	135			90	270	36	2	1	1	21	
Haloptilus sp.				20							
Oithona sp.	40	5		45	20	10	10			3	1
Acartia sp.	10	11	5	310	40	3			1		
Heterorhabdidae sp.	10			30		1					
Tenora sp.	15	10				1	13			2	1
Candacia sp.	15	1		10	30	6	10		2	26	3
Metridia sp.					10	11					
Oncaea sp.							1				
Euchaeta marina	5			5							
Sapphirina sp.		6		1	10						
Lucicutia sp.				50		1					
Pontellopsis sp.		4	1				1	1			
Centropages bradyi	6	3		20							
Eucalanus elongatus	5			20		1				1	1
Labidocera trispinosa						1					
Calocalanus pavo							1				
Microcalanus sp.							6		1	15	
Scolecithrix sp.		1								3	
Calanus gracilis							5				
Euchirella pulchra	5					2					
Calanus robustior										2	
Copepoda larvae(unidentified)				5		2	2			1	2
Copepoda (unidentified)		3		1		1		2		2	
Ostracoda:											
Conchoecia sp.	10			45	30	1	1			3	
Cladocera:											
Evadne sp.			8	60		4		1			
Amphipoda:											
Brachyscellus sp.					10						
Vibilia sp.		3									
Paraphronima gracilis				3		1					
Scina sp.					20						
Amphipoda (unidentified)	5				40					1	
Euphausiacea:											
Unidentified species	225	84	1	225	520	35	65		1	22	
Decapoda:											
Unidentified larvae	5	6	7	5	10		2	1			
Sergestid larvae	10	1			10	4	1				
Cirripedia:											
Balanus sp. (cypris)	1	3			20						
Balanus sp. (nauplius)				10	30		2				
MOLLUSCA											
Pteropoda:											
Limacina sp.	5	1		5	190	6	2			36	2
Cavolinia sp.		1			20	2	8	1		7	
Heteropoda:											
Atlanta sp.	2	4	1		40	6	4		1	25	
Cephalopoda				1							
CHAETOGNATHA	242	121	14	300	460	52	26	2	1	12	2
ECHINODERMATA											
Auricularia larvae				15	30	3	1			3	
Echinopluteus larvae				20	5	4	12	1			
Ophiurid larvae							6				
TUNICATA											
Larvacea											
Oikopleura sp.	30	35		75	820	41	8	1		31	1
Thaliacea											
Salpa sp.			2	5	20	2	14		5	10	
Doliolum sp.	6	26	10	15	1	27	90	4		16	68
Invertebrate egg	25			14				26	2	2	
VERTEBRATA											
Fish larvae								5	1	1	
Sebastodes sp.	19	18	2	6							
Engraulis mordax		10			30	3					
Scorpaenichthys marmoratus		1									
Citharichthys stigmaeus	1										
Cottidae (unidentified)		2									
Fish eggs			19	165	20		1	19	8		

PLANKTON SUMMARY (NOVEMBER-DECEMBER)

Sample Number	PL#1	PL#2	PL#3	PL#4
Date	11/26	11/26	11/28	11/28
Time (GMT)	2010	0053	0115	1700
Duration of tow	½ hr.	½ hr.	½ hr.	½ hr.
Depth of sample	Surf.	Surf.	Surf.	Surf.
Type of tow	Horz.	Horz.	Horz.	Horz.
Ocean Station Number	18	12	9	13
Wet Volume	29 cc	40 cc	77 cc	35 cc
COELENTERATA				
Scyphomedusae	45	125(lar.	90	15
Hydrozoai:				
Siphonophora	5		14	5
CTENOPHORA	1	175	2	1
BRYOZOA				
(Cyphonautes)			2	10
ANNELIDA				
Polychaeta	10		2	1
ARTHROPODA				
Crustacea				
Copepoda:				
Euchaeta sp.		25	2	
Euchaeta major	5			
Metridia sp.	5			
Rhincalanus nasutus	5	175	62	
Rhincalanus cornutus		175	14	10
Sapphirina sp.	10		58	
Eucalanus elongatus	10			1
Calanus sp.	115	1375	2250	1080
Pontellopsis sp.		25	16	50
Candacia aethiopica		25	52	5
Gaetanus sp.	5			
Corycaeus sp.	5			
Pleuromamma sp.	1205	3700	918	
Copepoda (unidentified)	350	25		
Amphipoda:				
Primno macropa				1
Vibilia sp.			2	
Phronima atlantica		7		
Paraphrorima crassipes	7			
Paraphronima gracilis				7
Hyperia schizogeneios	7			
Anchylomera blossevillei		7		
Hyperoche medusarum		7		
Euphausiacea:				
Euphausia pacifica	1145	2325	1830	200
Isopoda:		20		
Ostracoda:				
Conchoecia sp.			1	
Decapoda:				
(Sergestid larvae)	5			
(Megalops larvae)	5	125		
(Unidentified larvae)	10	50	12	20
Cladocera:				
Evadne sp.			52	
Stomatopoda: (larvae)			25	
Cirripedia:				
Balanus sp.(cypris stage).				5
Balanus sp.(nauplius)			12	6
Arachnida:(mites)	1			
MOLLUSCA				
Pteropoda:				
Cliona sp.	15		8	
Cavolinia sp.	1	25	12	
Limacina sp.	45	150	1	
Heteropoda:				
Atlanta sp.	1			
Octopoda:	1		1	
TUNICATA				
Larvacea				
Oikopleura sp.	30	2725	385	235
Thaliacea				
Salpa sp.	5		85	40
Doliolum sp.	100	75	275	225
Pyrosoma sp.				1
Invertebrate egg		50	8	
VERTEBRATA				
Pisces (egg)	15			
Pisces (larvae) Sygnathidae,et.al.	2	6		1

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 1 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0718/25	34° 05.0'	119° 59.7'	Radar	3.0	0.3	0.1
1021	34° 05.2'	119° 59.5'	Radar	3.1	1.2	0.4
1329	34° 06.3'	119° 59.6'	Radar	3.5	1.0	0.3
1800	34° 06.5'	120° 00.9'	Radar	2.6	1.2	0.5
1936	34° 05.4'	120° 01.2'	Radar	9.6	1.3	0.1
0511/26	34° 04.9'	119° 59.7'	Radar	18.8	1.0	0.1
0958	34° 03.4'	119° 59.5'	Radar			

DROGUE NO. 2 Depth 1000 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0549/25	34° 14.9'	119° 58.5'	Radar	3.3	0.3	0.1
0909	34° 14.4'	119° 58.2'	Radar	3.1	0.8	0.3
1216	34° 13.8'	119° 58.9'	Radar	2.4	0.5	0.2
1440	34° 13.5'	119° 58.7'	Radar	3.2	1.1	0.3
1752	34° 13.3'	119° 59.8'	Radar	8.9	1.3	0.1
0247/26	34° 12.8'	119° 58.4'	Radar	20.2	1.9	0.1
2302	34° 11.0'	119° 57.3'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 3 Depth 300 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0515/25	34° 13.8'	119° 53.0'	Radar	3.2	1.2	0.4
0830	34° 12.8'	119° 53.6'	Radar	3.2	1.0	0.3
1144	34° 11.7'	119° 54.2'	Radar	4.1	1.2	0.3
1550	34° 10.8'	119° 53.3'	Radar	2.9	0.8	0.3
1847	34° 10.9'	119° 52.1'	Radar	9.1	2.3	0.3
0354/26	34° 11.8'	119° 49.5'	Radar	15.9	7.7	0.5
1949	34° 18.2'	119° 54.3'	Radar			

DROGUE NO. 4 Depth 50 ft. Month January Year 1964

Time/Day	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0507/25	34° 13.8'	119° 52.2'	Radar	3.4	1.6	0.5
0829	34° 12.2'	119° 52.9'	Radar	3.0	1.0	0.3
1127	34° 11.2'	119° 52.1'	Radar	4.0	1.0	0.2
1530	34° 12.0'	119° 51.2'	Radar	3.1	0.3	0.1
1836	34° 12.4'	119° 51.6'	Radar	9.5	3.2	0.3
0405/26	34° 14.2'	119° 48.4'	Radar	14.9	8.8	0.6
1902	34° 16.2'	119° 58.6'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 5 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
0630/25	34° 09.6'	119° 56.5'	Radar	3.4	0.9	0.3
0952	34° 08.6'	119° 56.5'	Radar	3.2	0.4	0.1
1302	34° 08.4'	119° 56.0'	Radar	3.1	1.2	0.4
1610	34° 08.5'	119° 54.4'	Radar	2.8	1.7	0.6
1900	34° 08.2'	119° 52.4'	Radar	8.6	3.1	0.4
0335/26	34° 08.5'	119° 48.5'	Radar	18.4	7.9	0.4
2200	34° 16.3'	119° 48.5'	Radar			

DROGUE NO. 6 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
2132/25	34° 08.9'	120° 29.4'	Radar	10.8	1.3	0.1
0821/26	34° 07.9'	120° 28.2'	Radar	4.3	0.5	0.1
1240	34° 07.6'	120° 28.8'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 7 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
2217/25	34° 13.4'	120° 25.3'	Radar	10.7	3.0	0.3
0858/26	34° 14.5'	120° 28.5'	Radar	4.7	1.9	0.4
1339	34° 16.0'	120° 30.4'	Radar	13.6	3.2	0.2
2719	34° 17.3'	120° 33.9	Radar			

DROGUE NO. 8 Depth 1000 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
2242/25	34° 15.9'	120° 23.2'	Radar	10.8	0.3	0
0933/26	34° 16.0'	120° 23.5'	Radar	4.8	0.5	0.1
1423	34° 16.2'	120° 23.5'	Radar	13.8	0.4	0
0412/27	34° 16.6'	120° 23.6'	Radar			

DROGUE NO. 9 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
2310/25	34° 19.0'	120° 20.5'	Radar	10.8	1.3	0.1
1001/26	34° 17.7'	120° 19.6'	Radar	4.8	0.6	0.1
1448	34° 17.7'	120° 20.5'	Radar	13.9	1.3	0.1
0442/27	34° 17.1'	120° 19.0'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 10 Depth 300 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
2331/25	34° 21.6'	120° 17.9'	Radar	11.0	1.3	0.1
1029/26	34° 20.9'	120° 16.6'	Radar	5.1	1.8	0.4
1533	34° 20.0'	120° 15.0'	Radar	13.5	2.6	0.2
0505/27	34° 17.1'	120° 16.2'	Radar			

DROGUE NO. 11 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
2339/25	34° 22.4'	120° 17.5'	Radar	10.9	1.2	0.1
1032/26	34° 21.5'	120° 16.5'	Radar	4.7	1.1	0.2
1516	34° 21.0'	120° 17.6'	Radar	15.6	1.3	0.1
0652/27	34° 20.4'	120° 16.0'	Radar			

DROGUE NO. 12 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
0001/26	34° 24.6'	120° 15.5'	Radar	11.0	1.4	0.1
1100	34° 23.8'	120° 14.2'	Radar	5.1	1.0	0.2
1608	34° 23.8'	120° 15.5'	Radar	13.7	2.8	0.2
0547/27	34° 23.0'	120° 12.4'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 13 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1719/28	34° 32.7'	120° 41.9'	Radar	6.2	1.2	0.2
2329	34° 33.9'	120° 42.0'	Radar	20.3	4.2	0.2
1945/29	34° 31.6'	120° 46.1'	Radar			

DROGUE NO. 14 Depth 300 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1648/28	34° 30.2'	120° 45.1'	Radar	1.1	0.2	0.2
1755	34° 30.0'	120° 45.5'	Radar	5.0	0.7	0.1
2256	34° 30.6'	120° 45.1'	Radar	1.1	0.3	0.3
0003/29	34° 30.6'	120° 45.5'	Radar	19.4	0.7	0
1926	34° 30.2'	120° 44.9'	Radar			

DROGUE NO. 15 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1639/28	34° 29.8'	120° 45.8'	Radar	1.4	1.0	0.7
1803	34° 30.5'	120° 46.4'	Radar	4.6	1.8	0.4
2238	34° 28.5'	120° 46.8'	Radar	1.9	1.1	0.6
0035/29	34° 27.6'	120° 47.0'	Radar	17.2	7.0	0.4
1750	34° 23.7'	120° 53.8'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 16 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1608/28	34° 27.5'	120° 49.0'	Radar	2.4	1.2	0.5
1830	34° 27.0'	120° 50.1'	Radar	3.0	0.2	0.1
2129	34° 26.7'	120° 50.3'	Radar	3.6	0.3	0.1
0105/29	34° 26.2'	120° 50.5'	Radar	14.1	6.0	0.4
1510	34° 24.4'	120° 57.6'	Radar	2.1	1.9	0.9
1714	34° 25.5'	120° 59.4'	Radar			

DROGUE NO. 17 Depth 1000 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1557/28	34° 26.6'	120° 49.6'	Radar	2.9	0.8	0.3
1853	34° 26.0'	120° 49.1'	Radar	3.2	1.5	0.5
2207	34° 25.0'	120° 48.1'	Radar	3.3	1.1	0.3
0125/29	34° 24.0'	120° 48.7'	Radar	17.1	9.7	0.6
1829	34° 22.1'	120° 37.5'	Radar			

Note: This drogue appears to have lost its parachute very early. Thus all data are probably for a float without its parachute. Winds on the 28th were from 320°-360° and 10-20 kts.

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 18 Depth 300 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1510/28	34° 24.8'	120° 53.0'	Radar	4.4	1.9	0.4
1935	34° 25.0'	120° 55.5'	Radar	1.3	0.7	0.5
2055	34° 25.6'	120° 55.9'	Radar	18.7	0.5	0
1535/29	34° 25.9'	120° 56.2'	Radar	0.8	1.4	1.8
1625	34° 27.0'	120° 57.4'	Radar			

DROGUE NO. 19 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1422/28	34° 21.5	120° 58.0'	Radar	5.9	4.5	0.8
2014	34° 25.3'	121° 00.7'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 1 Depth 50 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2210/28	34° 23.6'	120° 00.2'	Lorac	5.9	2.5	0.4
0404/29	34° 25.2'	120° 02.7'	Lorac	7.0	2.0	0.3
1106	34° 26.3'	120° 04.8'	Lorac	4.8	1.7	0.4
1552	34° 25.9'	120° 06.7'	Lorac	4.7	2.4	0.5
2032	34° 26.8'	120° 09.3'	Radar	8.5	2.9	0.3
0500/30	34° 26.3'	120° 13.0'	Lorac	4.2	2.3	0.5
0913	34° 27.2'	120° 15.4'	Radar	4.9	3.2	0.7
1408	34° 26.0'	120° 19.0'	Radar			

DROGUE NO. 2 Depth 50 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2356/28	34° 18.7'	120° 06.3'	Lorac	3.4	1.8	0.5
0321/29	34° 20.2'	120° 07.9'	Lorac	1.5	1.0	0.7
0454	34° 21.0'	120° 08.3'	Lorac	6.7	2.1	0.3
1134	34° 22.4'	120° 10.2'	Lorac	4.7	0.8	0.2
1618	34° 21.9'	120° 10.8'	Lorac	4.4	3.8	0.9
2040	34° 22.5'	120° 15.4'	Lorac	4.5	2.6	0.6
0110/30	34° 23.3'	120° 18.5'	Lorac	4.0	1.4	0.4
0513	34° 23.0'	120° 20.2'	Lorac	4.0	3.6	0.9
0913	34° 23.1'	120° 24.3'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 3 Depth 500 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
0100/29	34° 13.8'	120° 12.5'	Lorac			
				1.5	0.1	0.1
0229	34° 13.8'	120° 12.3'	Lorac			
				3.4	0.3	0.1
0554	34° 13.9'	120° 12.0'	Lorac			
				6.5	0.4	0.1
1224	34° 14.3'	120° 12.2'	Lorac			
				4.5	1.2	0.3
1654	34° 14.2'	120° 10.9'	Lorac			
				4.6	0.5	0.1
2128	34° 13.7'	120° 11.0'	Lorac			
				4.6	0.1	0
0206/30	34° 13.7'	120° 11.2'	Lorac			
				4.1	0.7	0.2
0611	34° 14.3'	120° 10.8'	Lorac			
				4.2	0.2	0
1021	34° 14.4'	120° 10.9'	Lorac			
				8.4	1.2	0.1
1844	34° 14.7'	120° 09.6'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 4 Depth 50 ft. Month Nov.-Dec. Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0144/29	34° 09.7'	120° 16.7'	Lorac	4.8	1.7	0.4
0628	34° 10.0'	120° 14.6'	Lorac	6.1	2.3	0.4
1234	34° 10.3'	120° 11.9'	Lorac	4.6	1.8	0.4
1711	34° 10.6'	120° 09.7'	Lorac	4.6	0.4	0.1
2146	34° 10.3'	120° 09.2'	Lorac	4.6	1.3	0.3
0220/30	34° 11.4'	120° 08.6'	Lorac	4.1	1.8	0.4
0629	34° 12.2'	120° 06.7'	Lorac	4.2	0.2	0
1040	34° 12.1'	120° 06.4'	Lorac	8.3	1.2	0.1
1901	34° 13.3'	120° 05.9'	Lorac	6.2	0.4	0.1
0111/1	34° 13.0'	120° 05.5'	Lorac			

DROGUE NO. 5 Depth 50 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0802/29	34° 05.9'	119° 59.8'	Lorac	5.5	1.7	0.3
1335	34° 05.9'	119° 57.7'	Lorac	4.5	1.2	0.3
1806	34° 06.2'	119° 56.3'	Radar	4.4	1.2	0.3
2228	34° 06.4'	119° 54.8'	Lorac	4.7	1.0	0.2
0308/30	34° 06.7'	119° 53.7'	Radar	3.9	0.9	0.2
0700	34° 06.9'	119° 52.8'	Radar	4.8	2.2	0.5
1148	34° 07.3'	119° 50.0'	Lorac	8.7	4.8	0.6
2028	34° 07.6'	119° 44.3'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 6 Depth 50 ft. Month Nov.-Dec. Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0844/29	34° 11.1'	120° 00.1'	Lorac	5.3	0.9	0.2
1402	34° 10.6'	119° 59.2'	Radar	4.4	0.3	0.1
1826	34° 10.4'	119° 59.4'	Lorac	4.4	0.9	0.2
2252	34° 10.8'	120° 00.3'	Lorac	4.0	0.7	0.2
0254/30	34° 10.7'	119° 59.5'	Lorac	4.1	0.5	0.1
0700	34° 10.8'	119° 58.9'	Lorac	4.2	0.3	0.1
1110	34° 10.5'	119° 58.9'	Lorac	8.4	1.4	0.2
1936	34° 10.7'	119° 57.2'	Lorac	6.6	1.6	0.2
0211/1	34° 10.0'	119° 55.7'	Lorac	9.7	3.1	0.3
1156	34° 08.2'	119° 52.4'	Lorac			

DROGUE NO. 7 Depth 300 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0928/29	34° 15.1'	119° 55.6'	Lorac	5.0	2.1	0.4
1428	34° 16.0'	119° 57.7'	Lorac	4.5	1.3	0.3
1859	34° 17.1'	119° 58.8'	Lorac	4.4	1.4	0.3
2324	34° 17.3'	120° 00.5'	Radar	0.6	0.2	0.3
2358	34° 17.3'	120° 00.7'	Lorac	4.1	1.4	0.3
0404/30	34° 17.9'	120° 02.1	Lorac	3.6	1.4	0.4
0743	34° 18.8'	120° 03.4'	Radar	5.6	2.6	0.5
1320	34° 21.1'	120° 05.3'	Lorac	10.5	6.7	0.6
2350	34° 26.2'	120° 10.2'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 8 Depth 50 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0958/29	34° 18.0'	119° 51.6'	Lorac	4.8	1.6	0.3
1448	34° 18.1'	119° 53.5'	Lorac	4.4	1.5	0.3
1915	34° 18.2'	119° 55.3'	Lorac	4.1	1.8	0.4
2324	34° 18.0'	119° 57.7'	Radar	0.3	0.2	0.7
2343	34° 17.9'	119° 57.8'	Lorac	4.3	1.7	0.4
0404/30	34° 18.7'	119° 59.6'	Radar	3.6	1.2	0.3
0743	34° 19.5'	120° 00.7'	Lorac	5.4	1.6	0.3
1306	34° 19.4'	120° 02.6'	Lorac	10.4	4.1	0.4
2333	34° 20.9'	120° 07.2'	Lorac			

DROGUE NO. 9 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1630/1	34° 15.1'	120° 35.0'	Lorac	0.8	0.7	0.9
1720	34° 14.7'	120° 34.5'	Radar	5.6	2.9	0.5
2254	34° 11.8'	120° 34.2'	Lorac	4.3	1.4	0.3
0310/2	34° 10.4'	120° 34.9'	Lorac	6.3	1.2	0.2
0928	34° 09.3'	120° 34.6'	Lorac	4.6	1.3	0.3
1407	34° 07.9'	120° 34.2'	Lorac	2.7	1.6	0.6
1644	34° 07.3'	120° 32.6'	Radar	3.4	1.8	0.5
2008	34° 05.5'	120° 32.2'	Radar	2.8	1.4	0.5
2255	34° 04.3'	120° 33.1'	Radar	5.2	0.7	0.1
0410/3	34° 04.2'	120° 33.8'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 10 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1716/1	34° 11.2'	120° 39.2'	Lorac	4.5	3.2	0.7
2148	34° 07.9'	120° 39.6'	Lorac	1.7	2.8	1.6
2330	34° 05.3'	120° 39.9'	Lorac	0.6	1.0	1.7
0004/2	34° 04.7'	120° 38.8'	Lorac	2.4	2.1	0.9
0230	34° 02.9'	120° 37.3'	Lorac	3.3	4.7	1.4
0548	33° 58.4'	120° 36.5'	Radar	1.7	1.2	0.7
0728	33° 57.3'	120° 35.7'	Lorac	7.9	6.6	0.8
1526	33° 52.1'	120° 30.8'	Lorac			

Note: This drogue is believed to have lost its parachute very early. All data are probably due to wind drift.

DROGUE NO. 11 Depth 500 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1756/1	34° 07.4'	120° 43.4'	Lorac	2.7	0.2	0.1
2038	34° 07.6'	120° 43.2'	Lorac	5.5	0.8	0.1
0206/2	34° 08.1'	120° 42.8'	Lorac	1.1	0.1	0.1
0310	34° 08.2'	120° 42.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 12 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1756/1	34° 07.4'	120° 43.4'	Lorac	2.5	0.9	0.4
2028	34° 06.7'	120° 44.2'	Lorac	0.5	0.3	0.6
2100	34° 06.7'	120° 44.6'	Radar	2.5	1.2	0.5
2330	34° 05.5'	120° 44.2'	Lorac	1.1	0.8	0.7
0034/2	34° 05.3'	120° 45.2'	Lorac	1.9	1.5	0.8
0230	34° 04.5'	120° 46.7'	Lorac	1.6	1.0	0.6
0404	34° 04.5'	120° 47.8'	Lorac	7.6	3.5	0.5
1138	34° 07.3'	120° 50.4'	Lorac	1.0	0.1	0.1
1238	34° 07.2'	120° 50.3'	Lorac	6.5	2.3	0.4
1907	34° 09.2'	120° 51.8'	Lorac	3.4	0.9	0.3
2230	34° 09.8'	120° 51.2'	Lorac	4.1	0.6	0.1
0234/3	34° 09.1'	120° 51.1'	Lorac	4.2	1.4	0.3
0648	34° 09.3'	120° 52.7'	Lorac	5.6	0.8	0.1
1222	34° 10.2'	120° 53.1'	Lorac	0.9	0.1	0.1
1318	34° 10.0'	120° 53.2'	Lorac	1.0	0.1	0.1
1419	34° 09.8'	120° 53.2'	Lorac	0.8	0.4	0.5
1509	34° 09.7'	120° 53.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 13 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1911/1	34° 00.7'	120° 51.0'	Lorac	6.3	0.8	0.1
0130/2	34° 00.7'	120° 51.9'	Lorac	2.7	1.3	0.5
0410	34° 01.0'	120° 53.3'	Radar	0.6	0.4	0.7
0446	34° 01.3'	120° 53.6'	Lorac	6.3	2.2	0.3
1104	34° 03.5'	120° 53.2'	Lorac	7.4	2.1	0.3
1826	34° 04.7'	120° 55.3'	Lorac	3.4	1.5	0.4
2152	34° 06.1'	120° 54.7'	Lorac	4.2	1.2	0.3
0205/3	34° 07.0'	120° 55.7'	Lorac	4.3	1.3	0.3
0621	34° 08.2'	120° 56.2'	Lorac	6.5	1.9	0.3
1252	34° 10.2'	120° 57.0'	Lorac	1.0	0.2	0.2
1351	34° 10.1'	120° 57.1'	Lorac	0.9	0.1	0.1
1445	34° 10.0'	120° 57.0'	Lorac	0.8	0.3	0.4
1536	34° 10.0'	120° 56.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 14 Depth 50 ft. Month December Year 1964

Time/Day	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1838/1	34° 03.7'	120° 47.8'	Lorac	1.3	0.4	0.3
1955	34° 04.2'	120° 47.9'	Lorac	4.6	1.1	0.2
0030/2	34° 03.9'	120° 49.1'	Radar	0.5	0.2	0.4
0102	34° 03.8'	120° 49.3'	Lorac	1.1	0.7	0.6
0206	34° 03.4'	120° 49.8'	Lorac	2.6	2.8	1.1
0440	34° 01.7'	120° 52.4'	Lorac			

DROGUE NO. 15 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1843/3	34° 02.3'	121° 16.9'	Lorac	6.0	6.6	1.1
0046/4	33° 56.9'	121° 21.5'	Lorac	6.3	4.7	0.7
0705	33° 52.7'	121° 24.0'	Lorac	7.7	7.2	0.9
1450	33° 45.5'	121° 25.2'	Lorac	6.6	1.7	0.3
2126	33° 44.9'	121° 24.8'	Radar	7.6	5.4	0.7
0500/5	33° 39.4'	121° 24.6'	Radar	7.6	1.5	0.2
1238	33° 37.0'	121° 24.1'	Lorac	7.2	0.7	0.1
1948	33° 36.7'	121° 24.8'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 16 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
1936/3	34° 06.1'	121° 12.1'	Lorac			
				0.8	1.2	1.5
2027	34° 05.2'	121° 13.2'	Radar			
				0.2	0.2	1.0
2042	34° 05.1'	121° 13.4'	Radar			
				2.7	2.7	1.0
2322	34° 02.8'	121° 15.2'	Radar			
				0.7	0.6	0.9
0002/4	34° 02.6'	121° 15.7'	Lorac			
				1.5	1.3	0.9
0134	34° 01.7'	121° 16.7'	Lorac			
				4.8	3.6	0.8
0622	33° 59.5'	121° 20.2'	Lorac			
				1.5	1.0	0.7
0753	33° 59.1'	121° 21.3'	Lorac			
				5.9	2.9	0.5
1347	33° 56.9'	121° 23.6'	Lorac			
				7.3	5.7	0.8
2105	33° 51.7'	121° 26.6'	Lorac			
				6.6	3.8	0.6
0342/5	33° 49.2'	121° 29.9'	Lorac			
				7.6	3.5	0.5
1117	33° 47.7'	121° 33.7'	Lorac			
				10.5	5.7	0.5
2150	33° 44.0'	121° 39.0'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 17 Depth 500 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
2024/3	34° 09.9'	121° 07.8'	Lorac			
				2.8	2.2	0.8
2312	34° 07.7'	121° 07.8'	Lorac			
				3.6	0.2	0.1
0246/4	34° 07.8'	121° 07.9'	Lorac			
				2.2	0.5	0.2
0456	34° 07.6'	121° 08.3'	Lorac			
				4.8	1.1	0.2
0944	34° 06.6'	121° 08.7'	Lorac			
				1.9	0.4	0.2
1138	34° 06.2'	121° 08.6'	Lorac			
				6.2	2.0	0.3
1750	34° 04.2'	121° 08.1'	Lorac			
				1.3	0.8	0.6
1906	34° 03.5'	121° 08.3'	Lorac			
				4.9	1.6	0.3
2358	34° 02.0'	121° 08.7'	Lorac			
				1.5	0.7	0.5
0129/5	34° 01.5'	121° 09.3'	Lorac			
				5.8	0.5	0.1
0716	34° 01.1'	121° 09.5'	Lorac			
				1.4	0.2	0.1
0838	34° 00.9'	121° 09.4'	Lorac			
				6.8	2.4	0.4
1521	33° 58.4'	121° 09.6'	Lorac			
				1.9	0.8	0.4
1713	33° 57.7'	121° 10.0'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 18 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2022/3	34° 10.0'	121° 07.7'	Lorac	2.7	1.25	0.5
2304	34° 08.9'	121° 07.0'	Lorac	3.4	3.8	1.1
0227/4	34° 05.6'	121° 09.3'	Lorac	2.9	2.2	0.8
0524	34° 03.7'	121° 10.7'	Lorac			

DROGUE NO. 19 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2105/3	34° 13.0'	121° 03.4'	Lorac	1.5	1.1	0.7
2236	34° 12.0'	121° 03.7'	Lorac	4.6	2.7	0.6
0310/4	34° 09.3'	121° 03.9'	Lorac	1.4	0.9	0.6
0434	34° 08.5'	121° 04.5'	Lorac	4.9	3.1	0.6
0929	34° 05.8'	121° 06.6'	Lorac	2.4	2.2	0.9
1154	34° 03.8'	121° 07.5'	Lorac	5.3	5.3	1.0
1713	33° 58.8'	121° 09.8'	Lorac	2.4	1.5	0.6
1940	33° 57.4'	121° 09.9'	Lorac	3.6	1.9	0.5
2315	33° 55.6'	121° 10.6'	Lorac	2.9	1.9	0.7
0212/5	33° 53.8'	121° 11.5'	Lorac	4.1	2.2	0.5
0616	33° 51.7'	121° 12.6'	Lorac	3.5	1.9	0.5
0946	33° 50.1'	121° 13.6'	Lorac	4.3	2.8	0.6
1403	33° 47.7'	121° 15.3'	Lorac	5.7	2.1	0.4
1946	33° 45.5'	121° 15.2'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 20 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2149/3	34° 17.1'	120° 59.6'	Lorac	6.1	2.7	0.4
0353/4	34° 14.7'	121° 01.0'	Lorac	6.8	2.2	0.3
1041	34° 13.7'	121° 03.5'	Lorac	7.8	4.9	0.6
1827	34° 08.9'	121° 05.2'	Lorac	6.2	1.7	0.3
0042/5	34° 07.6'	121° 04.9'	Lorac	7.2	1.6	0.2
0756	34° 06.1'	121° 04.6'	Lorac	8.5	0.9	0.1
1627	34° 05.3'	121° 04.3'	Lorac			

DROGUE NO. 21 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0219/6	34° 20.8'	120° 55.5'	Radar	7.7	4.7	0.6
1000	34° 17.4'	120° 51.6'	Radar	3.1	2.2	0.7
1306	34° 16.7'	120° 49.1'	Lorac	4.0	1.8	0.5
1706	34° 15.7'	120° 47.2'	Lorac	4.8	1.9	0.4
2152	34° 16.2'	120° 45.0'	Lorac	5.2	1.8	0.4
0303/7	34° 16.3'	120° 42.8'	Lorac	5.7	1.7	0.3
0843	34° 15.4'	120° 41.1'	Lorac	5.5	0.8	0.1
1416	34° 15.3'	120° 41.2'	Lorac	5.8	2.3	0.4
2005	34° 13.7'	120° 38.1'	Lorac	5.8	2.1	0.4
0152/8	34° 12.6'	120° 36.1'	Lorac	7.5	2.6	0.3
0922	34° 11.3'	120° 33.3'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 22 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
0258/6	34° 24.7'	120° 50.8'	Radar	6.5	0.4	0.1
0927	34° 24.5'	120° 51.2'	Radar	4.4	1.4	0.3
1351	34° 25.7'	120° 50.3'	Lorac	2.1	0.5	0.2
1555	34° 25.8'	120° 49.6'	Lorac	2.6	0.2	0.1
1830	34° 25.8'	120° 49.4'	Lorac	2.1	0.3	0.1
2037	34° 25.7'	120° 49.7'	Lorac	2.7	0.8	0.3
2322	34° 26.5'	120° 50.0'	Lorac	2.1	0.9	0.4
0131/7	34° 27.4'	120° 50.2'	Lorac	3.3	1.1	0.3
0450	34° 28.3'	120° 50.8'	Lorac	2.0	0.2	0.1
0651	34° 28.5'	120° 50.8'	Lorac	4.6	1.6	0.3
1125	34° 29.1'	120° 52.5'	Lorac	5.4	1.3	0.2
1652	34° 29.8'	120° 53.8'	Lorac	0.7	0.2	0.3
1737	34° 29.8'	120° 53.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 23 Depth 500 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0258/6	34° 24.7'	120° 50.8'	Radar	6.6	0.5	0.1
0932	34° 25.2'	120° 51.1'	Radar	4.4	1.3	0.3
1354	34° 26.2'	120° 50.3'	Lorac	1.9	0.2	0.1
1550	34° 26.3'	120° 50.2'	Lorac	3.8	0.2	0.1
1936	34° 26.5'	120° 50.0'	Lorac	0.9	0	0
2030	34° 26.5'	120° 50.0'	Lorac	2.9	0.6	0.2
2323	34° 26.8'	120° 50.5'	Lorac	2.0	0.6	0.3
0125/7	34° 27.2'	120° 51.0'	Lorac	3.5	0.9	0.3
0456	34° 28.0'	120° 51.3'	Lorac	1.8	0.2	0.1
0647	34° 28.2'	120° 51.5'	Lorac	4.5	0.8	0.2
1118	34° 28.9'	120° 51.9'	Lorac	5.4	0.7	0.1
1644	34° 29.4'	120° 52.3'	Lorac	1.1	0.1	0.1
1749	34° 29.3'	120° 52.4'	Lorac	5.0	0.4	0.1
2250	34° 29.5'	120° 52.9'	Lorac	6.8	1.0	0.1
0536/8	34° 30.6'	120° 52.7'	Lorac	6.3	0.8	0.1
1152	34° 30.8'	120° 51.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 24 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0334/6	34° 28.3'	120° 46.4'	Radar	5.4	1.7	0.3
0858	34° 29.4'	120° 48.0'	Radar	5.3	1.4	0.3
1415	34° 30.4'	120° 49.2'	Lorac	1.0	0.5	0.5
1514	34° 30.6'	120° 49.7'	Lorac	4.0	1.4	0.4
1916	34° 30.9'	120° 51.5'	Lorac	4.8	2.9	0.6
0005/7	34° 30.5'	120° 54.9'	Lorac	0.7	0.9	1.3
0048	34° 30.7'	120° 55.9'	Lorac	4.5	2.0	0.4
0520	34° 29.0'	120° 54.7'	Lorac	1.1	1.2	1.1
0628	34° 28.0'	120° 54.1'	Lorac	4.2	3.6	0.9
1042	34° 24.6'	120° 52.7'	Lorac	2.1	1.6	0.8
1251	34° 24.2'	120° 50.8'	Lorac	3.0	1.9	0.6
1552	34° 24.1'	120° 48.5'	Lorac	2.9	1.6	0.6
1844	34° 23.3'	120° 46.8'	Lorac	2.9	1.4	0.5
2136	34° 22.3'	120° 45.7'	Lorac	5.7	2.3	0.4
0321/8	34° 20.8'	120° 43.5'	Lorac	4.6	3.0	0.7
0758	34° 18.1'	120° 42.0'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 25 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
				(hr)	(nm)	(kts)
0412/6	34° 32.0'	120° 42.0'	Radar	4.1	1.7	0.4
0819	34° 33.0'	120° 43.7'	Radar	6.4	5.4	0.8
1443	34° 34.5'	120° 50.0'	Lorac	4.9	2.7	0.6
1936	34° 34.6'	120° 53.3'	Lorac	4.8	2.2	0.5
0027/7	34° 33.7'	120° 55.6'	Lorac	5.4	1.4	0.3
0551	34° 32.4'	120° 55.0'	Lorac	6.0	2.8	0.5
1152	34° 30.2'	120° 57.0'	Lorac	5.3	0.8	0.2
1710	34° 29.5'	120° 56.9'	Lorac	6.5	5.0	0.8
2340	34° 25.4'	120° 53.3'	Lorac	4.6	2.8	0.6
0418/8	34° 25.2'	120° 50.0'	Lorac Radar	2.4	1.7	0.7
0645	34° 24.7'	120° 48.0'	Lorac Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 26 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0724/9	34° 51.7'	121° 01.4'	Radar			
				4.3	0.3	0.1
1140	34° 51.6'	121° 01.8'	Radar			
				2.7	0.4	0.1
1423	34° 51.9'	121° 01.7'	Radar			
				8.6	0.8	0.1
2300	34° 52.0'	121° 02.5'	Radar			
				2.2	0	0
0113/10	34° 52.0'	121° 02.5'	Radar			
				1.9	0.4	0.2
0306	34° 52.3'	121° 02.9'	Radar			
				2.0	0.4	0.2
0506	34° 52.7'	121° 03.1'	Radar			
				2.6	0.6	0.2
0745	34° 52.9'	121° 03.7'	Radar			
				4.6	0.5	0.1
1219	34° 53.3'	121° 03.4'	Radar			

DROGUE NO. 27 Depth 500 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0730/9	34° 51.6'	121° 01.3'	Radar			
				4.3	0.8	0.2
1150	34° 52.4'	121° 01.0'	Radar			
				2.5	0.4	0.2
1423	34° 52.8'	121° 01.0'	Radar			
				12.4	1.5	0.1
0245/10	34° 54.2'	121° 00.4'	Radar			
				3.0	0.7	0.2
0545	34° 54.9'	120° 59.9'	Radar			
				4.2	0.6	0.1
0957	34° 54.9'	120° 59.3'	Radar			
				3.0	0.4	0.1
1300	34° 55.2'	120° 58.9'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 28 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0800/9	34° 53.7'	120° 57.4'	Radar			
				4.2	0.2	0
1214	34° 53.8'	120° 57.2'	Radar			
				1.6	0.3	0.2
1352	34° 53.7'	120° 56.8'	Radar			
				1.4	0.6	0.4
1514	34° 53.2'	120° 56.1'	Radar			
				1.3	0.5	0.4
1634	34° 52.9'	120° 56.2'	Radar			
				2.2	0.8	0.4
1846	34° 52.1'	120° 56.6'	Radar			
				3.5	0.3	0.1
2217	34° 52.0'	120° 56.3'	Radar			
				2.1	0.2	0.1
0021/10	34° 52.3'	120° 56.3'	Radar			
				1.7	0.7	0.4
0205	34° 52.4'	120° 55.5'	Radar			
				2.0	0.7	0.4
0405	34° 52.1'	120° 54.8'	Radar			
				2.6	0.9	0.3
0642	34° 51.3'	120° 54.4'	Radar			
				4.3	0.6	0.1
1100	34° 50.8'	120° 54.0'	Radar			

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February 1968. 53 p., including 16 figs., 2 tables. (TR-201)

This report summarizes the survey results of two cruises off Point Arguello, California, and presents some analysis of the oceanographic conditions observed. The main emphasis is on the currents.

In the appendix are bottom sediment logs, plankton summary tables, and current drogue summary sheets.

1. Oceanography
2. Point Arguello Area
3. Currents
4. Ship - USS REHOBOTH (AGS 50)

i. Title: Oceanographic Survey Results off Point Arguello, California, January and November-December 1964

ii. Author: Robert W. Thomas

iii. TR 201

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13. ABSTRACT

NAVOCEANO conducted two oceanographic surveys in the ocean area off Point Arguello, California, one in January and one in November-December 1964. The primary purpose of the surveys was to investigate the currents of the area; however, standard Nansen casts were taken, and bottom sediment and plankton samples were obtained.

Parachute current drogues were principally used to describe current movement off Point Arguello. A strong westerly flow along the northern portion of Santa Barbara Channel was noted in the surface layers. A corresponding easterly flowing current also was noted in the southern portion of the channel.

The major features of the surface flow appeared to be a counterclockwise rotating eddy just off Point Arguello and a deflection of the California Current due to the influence of Rodriquez Dome.

14 KEY WORDS	LINK A		LINK B		LINK C	
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